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MANUFACTURE OF AURICULATE FORM FOR HEARING AID

1. 2-32800 (A) (43) 12.2.1987 (19) JP

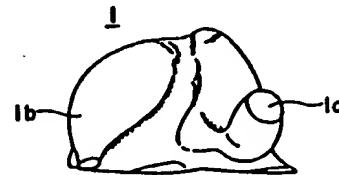
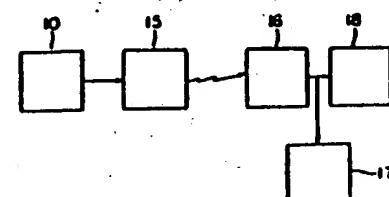
2) Appl. N. 60-171797 (22) 6.8.1985

3) RION CO LTD (72) HIROSHI SASAKI

4) Int. Cl'. H04R25/02

URPOSE: To manufacture a product of high quality in a short time by calculating digital numeric information measuring the shape of a primary auriculate form picked with impression material and obtaining a secondary auriculate form made of plastic material with a numeric processing based upon the information.

ONSTITUTION: A primary auriculate form 1 is formed, so that it is fitted for the external auditory meatus or the auditory meatus and the auricle of a person, injecting viscous and plastic liquid resin to an external ear and taking out after it is caked within the external ear. Following that, dimension obtained from a device 10 that collects three-dimensional data and on which the auriculate 1 is placed and scanned is digitized and data is informed to a manufacturing shop by a wired or wireless transmission means 15. The data is received and displayed 16, and is checked and stored 17, and also, using a numerical control working machine 18, plastic raw material is automatically worked, the secondary auriculate being manufactured. Thereby, deformation or damage during the transportation of the primary auriculate form can be prevented and a delivery date being shortened.



Japanese Patent Laid-Open Sho-62-328003. Detailed Description of the Invention- Application Field in Industry -

This invention relates to a method for manufacturing an auriculate form for a hearing aid, more particularly to a method for producing a secondary auriculate form from a primary auriculate form which is determined for each individual with an impression material, where the secondary auriculate form is used to obtain a customized hearing aid or an earplug for the hearing aid.

- Prior Art -

In recent years, such a hearing aid has been produced in a more and more miniturized size. At present, a very small hearing aid, i.e. so called customized hearing aid, prevails in the world. It includes a shell adaptable to the shape of the external acoustic meatus or the area surrounding it.

In the conventional method for manufacturing the above-mentioned shell, the shape of the external acoustic meatus or the area surrounding it is determined as a primary auriculate form with an impression material, and then the primary mold is transferred to a maker via an appropriate means like mail, and the maker completes the manual production of a shell or earplug from the mother mold of the primary auriculate form.

Such a method for manufacturing the auriculate form is also applied all over the world.

- Problems to be Solved with the Invention -

In such a method of the prior art, however, there appears a problem that a small error in the shape of this shell or earplug can be produced, since the primary auriculate form is deformed during its transportation to the maker.

In addition, there are other problems in that the quality of goods and number of manufacturing steps depend on the skill of workers to a great extent, due to the manual work involved in producing the secondary auriculate form which is a standard to obtain the shell or earplug, and the applicable plastic materials are considerably restricted as well.

Accordingly, the object of this invention is to offer a method for manufacturing an auriculate form for a hearing aid, wherein the transportation of the primary auriculate form to the maker can be avoided, and the manual work for producing the secondary auriculate form can also be avoided; Thereby, it is made possible to produce high quality goods in a shorter period, and the selection of usable materials is greatly expanded.

In this case, the secondary auriculate form is not only the shell or earplug for a hearing aid, but also the mother form used for producing the shell or earplug by means of plastic molding.

- Means for Solving the Problems -

In accordance with the present invention, the method for manufacturing an auriculate form for a hearing aid comprises the following steps:

- determining a primary auriculate form of an individual with an impression material,
- collecting digital numeric information on an ear by measuring the geometry of the primary auriculate form, and
- producing a secondary auriculate form made of plastic material with numerical control processing on the basis of the digital numeric information.

- Function -

In the present invention, the digital numeric information on the primary auriculate form is transferred to a maker, and then the secondary auriculate form is produced by the maker by means of a machine which is controlled on the basis of the digital numeric information.

- Preferred Embodiment -

An embodiment of an hearing aid for producing a shell for a hearing aid of the type customized for an individual's ear with a secondary auriculate form itself will be elucidated.

In the first step, a primary auriculate form is determined by injecting a viscous plastic material to the auriculate area of an individual, so as to fit it to his external acoustic meatus or his helix together therewith, and then hardened therein to obtain primary auriculate form 1, as shown in Fig. 3. This method is conventionally adopted in a hospital or a shop for hearing aids.

Primary auriculate form 1 includes a projection 1a corresponding to the external acoustic meatus and a swell 1b corresponding to the helix.

In the second step, the primary auriculate form is measured and then the measured values are transformed to digital numeric information. This procedure can be carried out advantageously by utilizing the technique which the present applicant has already provided (Application Number of Japanese Patent Sho-60-111560). The primary auriculate form 1 is positioned to the cartesian coordinate system and each position of the primary auriculate form is determined as a set of coordinates, and then the values determined are transformed to digital numeric information. This method is detailed, referring to Fig. 2. In data collecting apparatus 10, length determining means 11A, 11B and 11C determine the respective length of perpendiculars from the point of the primary auriculate form 1 to the respective coordinate planes. Scan-detecting means 12A, 12B and 12C move the respective length determining means 11A, 11B and 11C in the respective directions parallel to the corresponding coordinate planes, thereby determining the foot of each of the respective perpendiculars of the point, that is the coordinate of the point of the primary auriculate form. Coordinate specifying means 13 provides a predetermined range of the position and length to be scanned in the respective length detecting means 11A, 11B and 11C.

The coordinate data of each point in the primary auriculate form are transferred to resultant data processing means 14, thereby processing a format necessary for producing the secondary auriculate form so that the data are transformed to digital numeric information.

Data collecting means 10 can be installed at shops for hearing aids or other places. Digital numeric information obtained therein are supplied to display means 16 in the maker via an appropriate transmission means, such as a telephone network. Display means 16 provides a graphic display of the transmitted digital numeric information by re-transforming it to the primary auriculate form, thereby making it possible to carry out pre-processes of manufacturing, e.g., inspection of mistakes or errors in the information, the determination of trimming the shell by superimposing parts integrated in the shell onto the displayed information and so on.

Signals processed in display means 16 are transferred to storing means 17, and some parts of the digital numeric information are stored therein, and also further transferred to numerical control processing machine 18. A secondary auriculate form corresponding to the primary auriculate form, e.g., the shell of a hearing aid of the type customized for the individual's ear, can be manufactured by automatically processing a plastic material in numeric control processing machine 18.

As a means for transforming the primary auriculate form to digital numeric information, a known apparatus for producing a model from an original sculpture can be used, if necessary.

A wireless communication network can also be used as transmission means 15. In such a transmission means, the time necessary for transmitting the digital numerical information of a primary auriculate form to a maker is greatly reduced, so that a rapid delivery of goods to the user can be realized. This is particularly effective in the case of a long distance between the maker and the place where the primary auriculate form is collected. Since the time necessary for the transmission of information can be reduced even between nations, it is possible to realize a worldwide network of supplying goods of an appropriate number of orders can be obtained and if the necessary cost of delivery, for air cargo, can be taken into account.

Numerical control processing machine 18 in the above mentioned embodiment is a machine preferably used to produce a single second auriculate form of an individual. Such a machine can be selected in an adequate way among those suitable for mass production, so called NC machines.

Since the secondary auriculate form can be processed automatically with the aid of numeric control, the result of the finished product does not depend on the skill of the worker. In the conventional method, there is a difficulty in high precision-production of a secondary auriculate form in accordance with user's order, in which case the adjustment of the shell size is carried out with the aid of the thickness of paint film which is applied to the inner surface of a plaster. In accordance with the present invention, however, a high precision production in conjunction with the user's order is possible. The control of the size can be achieved with greater accuracy by introducing appropriate correcting factors to digital numeric information. The rigidity of goods can also correspond to the user's requirement.

Furthermore, the expansion of the selective range in the material for the secondary auriculate form provides a high quality secondary auriculate form, since it can be produced with automatic mechanical processing.

In the above embodiment, it is shown that the secondary auriculate form is used as a shell for hearing aid. In accordance with the present invention, however, the secondary auriculate form can also be used as an earplug for a hearing aid, and further as a mother mold for producing a shell or earplug by means of the plastic molding, as demonstrated in Japanese Patent Application No. Sho-60-137669.

- Advantage of the Invention -

As can be seen from the above description, the present invention successfully provides high quality products in a significantly reduced production rate without both the transportation of the primary auriculate form and manual process of the secondary auriculate form, since the secondary auriculate form can be produced in the NC process by utilizing digital numeric information which is obtained from the geometrical measurement of the primary auriculate form.

Japanese Patent Laid-Open Sho-62-32800

Date of Laid-Open: February 12, 1987
Application No.: Sho-60-171797
Date of Filing: August 6, 1985
Applicant: RION CO LTD
Title of the Invention:
"Method for Manufacturing Auriculate Form
for Hearing Aid"

Claims

1. A method for manufacturing an auriculate form for a hearing aid, wherein a primary auriculate form is determined with an impression material, and digital numerical information on the ear is collected by measuring the geometry of the primary auriculate form, and thus a secondary auriculate form made of plastic material is produced with numerical control processing on the basis of the digital numerical information.
2. A manufacturing method defined in claim 1, wherein the digital numerical information can be transmitted to a shop for processing the secondary auriculate form via a communication network.
3. A manufacturing method defined in claim 1, wherein the secondary auriculate form is an earplug or a shell of the hearing aid.
4. A manufacturing method defined in claim 1, wherein the secondary auriculate form is a mother mold for producing an earplug or a shell of the hearing aid by the plastic molding process.
5. A manufacturing method defined in claim 3 or 4, wherein the trimming of the shell is determined by superimposing the shell and the shape of parts integrated in the shell with the graphic display, before the numerical control processing.

Figure Caption and Symbols Used

Fig. 1 Block diagram of the manufacturing apparatus

Fig. 2 Block diagram of data collecting apparatus

Fig. 3 Front view of the primary auriculate form

- 1 Primary auriculate form
- 1a Projecting portion for external acoustic meatus
- 1b Expanding portion for helix
- 10 Data collecting apparatus
- 11 A - C Length detecting means
- 12 A - C Scan-deflecting means
- 13 Coordinate specifying means
- 14 Resultant data processing means
- 15 Transmission means
- 16 Display means
- 17 Storing means
- 18 Numerical control processing machine

⑨ 日本国特許庁 (JP)

⑩ 特許出願公開

Laid-Open

⑪ 公開特許公報 (A)

昭62-32800

⑫ Int.Cl.
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7326-5D

⑬ 公開 昭和62年(1987)2月12日

審査請求 未請求 発明の数 1 (全1頁)

⑭ 発明の名称 捕聴器用耳型の製作方法
Application

⑮ 特願 昭60-171797

⑯ 出願 昭60(1985)8月6日

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明細書

1. 発明の名称

捕聴器用耳型の製作方法

2. 特許請求の範囲

- (1) 印象材を用いて採取した一次耳型の形状を計測してデジタル数値情報を得、このデジタル数値情報に基づく数値制御加工によりプラスチック材料でなる二次耳型を得る捕聴器用耳型の製作方法。
- (2) 通信回線により、二次耳型を加工する場所へデジタル数値情報を伝送する特許請求の範囲第1項記載の捕聴器用耳型の製作方法。
- (3) 二次耳型が、捕聴器のシェルおよび耳せんのいずれかである特許請求の範囲第1項記載の捕聴器用耳型の製作方法。
- (4) 二次耳型が、プラスチック成形により捕聴器のシェルおよび耳せんのいずれかを製作するための母型である特許請求の範囲第1項記載の捕聴器用耳型の製作方法。
- (5) シェルと、このシェルに組込む部品の形状

とをスーパーインボーズしてグラフィックデスプレイし、数値制御加工に入る前に予め前記シェルのトリミングを決定する特許請求の範囲第3項または第4項記載の捕聴器用耳型の製作方法。

3. 発明の詳細な説明

(産業上の利用分野)

この発明は、捕聴器用耳型の製作方法に関するものであり、さらに詳しくいと、印象材を用いて採取した個人の一次耳型から、カスタムインジイヤ形捕聴器のシェル、あるいは捕聴器用耳せんを得るための二次耳型を製作する捕聴器用耳型の製作方法に関するものである。

(従来の技術)

近来、捕聴器のサイズは、小形化の一途をたどり、現在では、各個人の外耳道やその周辺の形状に適合するシェルをもつ、小形の、いわゆるカスタム捕聴器が、世界的に普及するにいたっている。

従来、上記のシェルを製作する方法として、

各個人の外耳道やその周辺の形状を、印象材によって型取りして一次耳型を採取し、この一次耳型を、郵送などの手段でメーカーへ送り、メーカーでは、一次耳型を母型として、手作業により二次耳型を得て、シェルや耳せんを作成していた。

また、かような耳型製作方法は、世界的にはとんど同様である。

(発明が解決しようとする問題点)

以上のような従来の補聴器用耳型の製作方法では、一次耳型のメーカーへの輸送中に、一次耳型が変形し、そのため、製作したシェルや耳せんの外形に微妙な誤差を生じるという問題点があつた。

また、シェルや耳せんを得るために二次耳型の製作を手作業で行つていたため、製品の品質や工数などが、作業者の熟練度に大きく依存し、素材となるプラスチック材料の選択範囲も狭いなどの問題点もあつた。

この発明は、かような問題点を解消しようと

タル数値情報で制御される加工機によつて二次耳型を製作する。

(実施例)

以下、二次耳型自体でカスタムインジャヤ形補聴器のシェルを加工形成する場合の一実施例について説明する。

まず、一次耳型の採取であるが、個人の外耳道、あるいは外耳道と耳殻に適合するように、粘性の液状樹脂を外耳に注入し、それを外耳内で固化させて第3図に示す一次耳型を得る周知の方法があり、病院や補聴器販売店において容易に採取することができる。

一次耳型1は、外耳道に対応する突起部1aと耳殻に対応する膨出部1bとが一体のものである。

次に、採取した一次耳型の形状を計測し、この計測値をデジタル数値情報に変換するのであるが、それには、本出願人の先頭に係る特願昭60-111560号で開示した技術を好適に実施することができる。すなわち、互いに等しい角

するもので、一次耳型のメーカーへの輸送を排除することができ、かつ、二次耳型の手作業による製作も省くことにより、高品質の製品を短時間に製作することができ、かつ、材料の選択も任意である補聴器用耳型の製作方法を得ることを目的とする。

なお、ここでいう二次耳型とは、それ自身が補聴器のシェルまたは耳せんである場合に限らず、プラスチック成形によつてシェルまたは耳せんを製作するための母型をも含むものとする。

(問題点を解決するための手段)

この発明に係る補聴器用耳型の製作方法は、印象材を用いて個人から採取した一次耳型の形状を計測し、この計測値をデジタル数値情報に変換し、このデジタル数値情報により、プラスチック材料を数値制御加工して二次耳型を形成する。

(作用)

この発明においては、一次耳型のデジタル数値情報をメーカーへ伝送し、メーカーは、デジ

度で交差する3つの平面を座標面とし、これら座標面で囲まれた空間に一次耳型1を配置し、一次耳型1の所要の各点の座標から一次耳型1の形状を計測し、この計測値をデジタル数値情報に変換するものである。これを、第2図によつて、もう少し詳しく説明すると、第2図はデータ収拾装置10を示し、3つの座標面それについての距離検出器11A、11B、11Cは、一次耳型1の各点から座標面へ下ろした垂線の長さを検出する。走査偏向手段12A、12B、12Cは、距離検出器11A～11Cをそれぞれの座標面と平行に移動するもので、上記垂線の足の位置、すなわち、一次耳型1の各点の座標面上の位置を決定する。座標設定手段13は、各距離検出器11A～11Cで走査すべき位置および距離の範囲を予め設定する。

以上による一次耳型1の各点の座標データは、データ合成処理手段14に人力され、二次耳型を製作するのに必要な形式に処理され、かつ、対応するデジタル数値情報に変換される。

データ収拾装置10は、補聴器の販売店等に設置され、ここで得られた一次耳型のデジタル数値情報は、第1図に示すように、電話通信回線のような伝送手段15を介して、メーカーに設置されている表示手段16に入力される。表示手段16は、送られたデジタル数値情報を一次耳型1の形状に戻してグラフィックデスプレイし、情報に欠落や誤りがなかつたかどうかを確かめたり、また、シェル内へ組み込む部品をスーパーインボーズしてデスプレイすることにより、シェルのトリミングを決定する等、加工の前段処理を行う。

表示手段16で処理された信号は、蓄積手段17へ送られて所望の個数分のデジタル数値情報が蓄積されると共に、数値制御加工機18へ入力される。数値制御加工機18では、プラスチック材料を自動加工して、一次耳型1に対応する二次耳型、すなわち、カスタムインジイヤ形補聴器のシェルを製作する。

なお、一次耳型1の形状をデジタル数値情報

に変換する手段としては、上記のほか、彫刻などの原型から模型を作るための周知の装置があり、適宜に用いることができる。

また、伝送手段15としては、無線による情報通信回線でもよい。このようにして、一次耳型のデジタル数値情報をメーカーへ送るに要する時間の短縮の効果は、製品をユーザーへ速やかに納品することができるばかりでなく、一次耳型の採取地とメーカーとが遠隔である場合は特に顯著であり、通信回線を利用することにより、国際間であつても情報伝達が短時間にできるので、完成した製品を航空便などで輸送する場合、妥当な輸送コストを考慮して、ある程度の注文量をまとめるようにすれば、世界的な製品供給網を形成することも可能となる。

さらに、数値制御加工機18は、上記実施例では、各個人用の单一の二次耳型を製作するものを念頭においていたが、一般には、中量生産に適した、いわゆる NC ファンシングが現存しており、適宜に選択使用することが考えられる。

には、特開昭60-157669号で開示したような技術により、プラスチック成形でシェルや耳せんを製作するための母型であつてもよいことは前記のとおりであり、同様の効果を奏する。

(発明の効果)

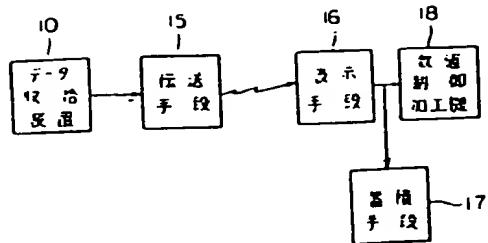
以上の説明から明らかなように、この発明は、一次耳型の形状を計測して得たデジタル数値情報を用いて、数値制御加工により二次耳型を製作することから、一次耳型の輸送や、手作業による二次耳型の加工を排除し、高品質の製品を短時間に製作することができる効果がある。

4. 図面の簡単な説明

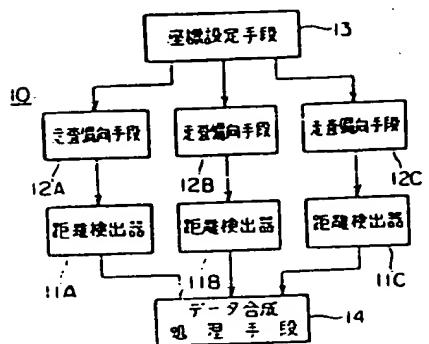
図面はこの発明の一実施例を説明するためのもので、第1図は製作装置のプロック図、第2図はデータ収拾装置のプロック図、第3図は一次耳型の正面図である。

1...一次耳型、10...データ収拾装置、
15...伝送手段、16...表示手段、18...
数値制御加工機。

第 1 図



第 2 図



第 3 図

